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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,055	11/14/2001	Bruce F. Macbeth	905_132NP	4851

44564 7590 06/21/2005

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EXAMINER	
TERESINSKI, JOHN	

ART UNIT	PAPER NUMBER
2858	

DATE MAILED: 06/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/992,055	MACBETH ET AL.	
	Examiner	Art Unit	
	John Teresinski	2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 October 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,24, 25, 31-38, 41-43 and 45* is/are rejected.

7)☒ Claim(s) *15-23,26-30,39,40,44 and 46-55* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,659,453 to Russell et al. in view of U.S. Patent No. 4,325,098 to Heller.

Regarding claim 1, Russell et al. disclose a power line circuit which detects load current fluctuations in a load current and line voltage fluctuations in a line voltage (column 4 lines1-5) and detecting upstream or downstream transient event/the direction of a transient event/arc fault relative to a monitoring location of a system (column 2 lines 38-47). Russell et al. does not disclose detecting an upstream transient event when the current fluctuations and voltage fluctuations are in phase or detecting a downstream transient event when the current fluctuations and voltage fluctuations are out of phase. Heller discloses a power line circuit with an upstream/downstream discriminator circuit (column 3 lines 62-68), that detects/measures current and voltage magnitudes (column 3 lines 62-68) for detecting an upstream transient event/backward direction fault when the current fluctuations and voltage fluctuations are in phase/phase concordance and detecting a downstream transient event/forward direction fault when the current fluctuations and voltage fluctuations are out of phase/phase discordance (column 4 lines 14-25). It would have been obvious to one of ordinary skill in the art at the time

the invention was made to include upstream and/or downstream transient events as taught by Heller into Russell et al. for the purpose of providing a reliable indication of fault direction.

Regarding claim 3, Russell et al. disclose transient events that produce a low frequency spectrum (column 9 lines 64-67).

Regarding claim 4, Russell et al. disclose steps in load current are detected with a current transformer (column 4 lines 5-8).

Regarding claim 5, Russell et al. disclose current fluctuations are detected across an impedance (18) in series with the line (12).

Regarding claim 7, Russell et al. disclose steps in load current produced by steps in line voltage are connected to at least one input of a microprocessor (Fig. 1 elements 30, 34 and 35).

Claims 11-13, 36-38, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,659,453 to Russell et al. in view of U.S. Patent No. 5,796,259 to Dickmander.

Regarding claims 41 and 42, Russell et al. disclose the method and device as described above but does not teach comparing the polarities of said voltage fluctuations and said current fluctuations, wherein said comparison indicates whether an arc fault or arc mimicking noise is located in said branch circuit portion or located in a remainder of said electrical distribution system based on the comparison of the polarities. Dickmander discloses a method and device including means for detecting current fluctuations in at least one current characteristic of a load current (column 2 lines 60-67), means for detecting voltage fluctuations in at least one voltage characteristic of a line voltage (column 2 lines 60-67) and means for comparing the polarities of

said voltage fluctuations and said current fluctuations, wherein said comparison indicates whether a fault is located in said branch circuit portion or located in a remainder of said electrical distribution system based on the comparison of the polarities (column 3 lines 5-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include comparing the polarities of said voltage fluctuations and said current fluctuations as taught by Dickmander into Russell et al. for the purpose of providing a reliable indication of fault direction.

Regarding claims 11, 36 and 38, Russell et al. disclose a first sensor for detecting current fluctuations (column 4 lines 1-5), and a second sensor for detecting voltage fluctuations (column 4 lines 1-5).

Regarding claims 12 and 37, Russell et al. disclose an interrupting mechanism responsive to a signal from the discriminator, wherein the interrupting mechanism does not disconnect the load from the electrical distribution system when the arc fault is located in the remainder of the electrical distribution system (column 7 lines 1-8).

Regarding claim 13, Russell et al. disclose arc faults occurring in the protected branch portion produce contrary step directions with respect to faults occurring in the remainder of the electrical distribution system (column 7 lines 1-8) and monitoring half cycles of power line frequency (column 2 lines 28-30).

Claims 2 and 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. and Heller as applied to claim 1 above, and further in view of U.S. Patent No. 5,439,509 to Blades.

Regarding claims 2 and 6, Russell et al. does not disclose transient events producing a high frequency spectrum or a high pass filter. Blades discloses a method and apparatus for detecting arcing in power systems and that it is well known to utilize a high pass filters detect steps in line voltage (column 21 lines 18-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Russell et al. for the purpose of providing a convenient means of acquiring high frequency noise (column 21 lines 18-42).

Claims 8-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. and Heller as applied to claim 1 above, and further in view of U.S. Patent No. 4,922,368 to Johns.

Regarding claim 8, Russell et al. as modified does not disclose out of phase steps in line voltage and load current produced by upstream line impedance. Johns discloses out of phase steps in line voltage and load current produced by an upstream line impedance (column 11 lines 52-68, column 12 lines 44-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include out of phase steps produced by upstream impedance as taught by Johns into Russell et al. as modified for the purpose of establishing the proper direction of a fault.

Regarding claims 9 and 10, Russell et al. as modified does not disclose inherent or introduced line impedance for producing a voltage drop. Johns discloses an inherent (column 5 lines 55-64) and introduced line impedance (column 10 lines 55-64) for producing a voltage drop. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include an inherent and introduced voltage drop as taught by Johns into Russell et al. as

modified for the purpose of producing accurate measurements by properly accounting for line characteristics.

Claims 24, 25, 33, 43 and 45 rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. and Dickmander as applied to claims 11 and 42 above, and further in view of U.S. Patent No. 5,439,509 to Blades.

Regarding claims 33, 43 and 45, Russell et al. as modified does not disclose a transient events producing a high frequency spectrum or a high pass filter. Blades discloses a method and apparatus for detecting arcing in power systems and that it is well known to utilize a high pass filters detect steps in line voltage (column 21 lines 18-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Russell et al. as modified for the purpose of providing a convenient means of acquiring high frequency noise (column 21 lines 18-42).

Regarding claims 24 and 25, Russell et al. as modified does not disclose pre-determined hold times. Blades discloses that it is well known in detecting arcing to utilize a microprocessor to detect steps in line voltage (column 21 lines 18-42) and pre-determined hold times (column 22 lines 40-49). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the high pass filter and microprocessor as taught by Blades into Russell et al. as modified for the purpose of providing a convenient means of acquiring high frequency noise (column 21 lines 18-42).

Claims 31, 32, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. and Dickmander as applied to claim 11 above, and further in view of U.S. Patent No. 4,922,368 to Johns.

Regarding claims 31, 32, 34 and 35, Russell et al. as modified does not disclose an impedance in series with a power line. Johns disclose a method and apparatus for detecting faults including detecting steps in load current across an impedance in series with a power line (column 6 lines 27-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include an impedance element as taught by Johns into Russell et al. as modified for the purpose of providing an output voltage indicative of current (column 6 lines 35-42).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. and Dickmander as applied to claim 11 above, and further in view of in view of U.S. Patent No. 5,572,138 to Nimmersj"o.

Regarding claim 14, Russell et al. as modified does not disclose differentiating sensors. Nimmersj"o discloses a method for determining the direction of a fault including differentiating sensors (column 3 lines 31-37). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include differentiating sensors as taught by Nimmersj"o into Russell et al. as modified for the purpose of accurately determining the location of a fault.

Allowable Subject Matter

Claims 15-23, 26-30, 39, 40, 44 and 46-55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 8 April 2005 have been fully considered but they are not persuasive.

In response to applicants arguments that Russell et al. does not suggest detecting fluctuations in at least one load current characteristic and voltage fluctuations in at least one voltage characteristic the examiner disagrees. Applicant is referred to Russell et al. (column 2 lines 26-57), which clearly shows detecting fluctuations in at least one load current characteristic, specifically bursts in current due to arcing faults (lines 28-30) and voltage fluctuations in at least one voltage characteristic/voltage peak (lines 30-31). Further the cited portion indicated in the rejection (column 4 lines 1-5) teaches monitoring load current and line voltage which would include detecting fluctuations/changes/bursts of load current and line voltage.

In response to applicants arguments regarding the combination of Russell et al. and Heller, motivation to combine and teaching all of the claim limitations including teaching an arc fault sensor, the examiner is not persuaded. Russell et al. clearly teaches an arc fault sensor (column 6 lines 26-30) and determining the direction of an arcing fault wave based on the phase relationship between the arcing fault current and the power system phase voltage (column 2 lines 38-47). Russell et al. also teaches that arcing faults can be identified by correlating arcing burst patterns to voltage peaks (column 2 lines 27-30). Russell et al. as indicated above and in the previous office action fails to teach detecting upstream transient events when the current and voltage fluctuations are in phase and downstream transient events when the current and voltage fluctuations are out of phase. Heller discloses detecting the position of a fault on an electrical link and further teaches indicating the direction by comparison of voltage and current phases. Heller is relied upon merely to supply indication of an upstream/backward direction fault when current and voltage measurements are in phase and indication of a downstream/forward direction fault when current and voltage fluctuations are out of phase (column 4 lines 14-25). Further the recitation "arc fault detector" occurs in the preamble of claim 1. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Since Heller does teach detecting the position of a faults in general on an electrical link based on phase comparisons and the teachings of Russell et al. as

indicated above it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two references.

In response to applicants arguments pertaining to claims 11, 41 and 42, specifically the combination of Russell et al. and Dickmander, the examiner is not persuaded. Russell et al. teaches detecting fluctuations in at least one load current characteristic and voltage fluctuations in at least one voltage characteristic as indicated above in order to detect arc faults. Dickmander is relied upon to show that it is known to compare the polarities of voltage fluctuations and current fluctuations, wherein said comparison indicates whether a fault is located in said branch circuit portion or located in a remainder of said electrical distribution system based on the comparison of the polarities (column 3 lines 5-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include combining the fault direction teachings of Dickmander into Russell et al. for the purpose of more efficient fault detection.

It is respectfully requested that applicant consider the prior art references in their entirety.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Teresinski whose telephone number is (571) 272-2235. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JT

JT
June 15, 2005

ANJAN DEB
PRIMARY EXAMINER